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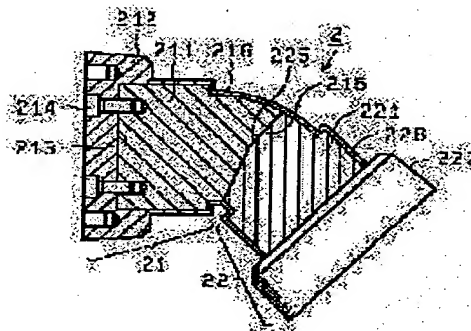
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(54) INJECTION MOLDING DIE

(57)Abstract:

PROBLEM TO BE SOLVED: To increase heat conductivity and provide high corrosion resistance by applying the surface treatment using an alloy of nickel and tungsten on the outer face of a core main body composed of copper alloy.

SOLUTION: One small core 21 is formed by inserting a base of a core main body 211 composed of copper alloy into a recessed section 213 of a core ring 212, installing the core ring 212 by using a ball 14 and curing the outer face except an end hitting recessed face 215 of a small core 21 with a film 216. The other small core 22 is formed by mounting a base of the core main body 221 composed of a copper alloy or a core ring 222 in a similar manner for the above-said small core 21 and coating the outer face except an end heating protruded face 225 of the small core 22 with a film 226 formed of the nickel and tungsten alloy by plating. The high heat conductivity and high corrosion resistance can be provided and the fear of generating of corrosion on the outer face of the cores is eliminated by the arrangement.



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【特許請求の範囲】

【請求項1】 銅合金からなるコア本体の外面にニッケルとタングステンの合金による表面処理が施されることにより高耐蝕性が付与されていることを特徴とする射出成形用金型。

【請求項2】 銅合金の代わりに炭素鋼を使用したことを特徴とする請求項1記載の射出成形用金型。

【請求項3】 コアが複数個の小コアからなり、金型閉合時に複数個の小コアの衝合面同士が衝合してコアが形成される射出成形用金型であって、小コアの本体が銅合金からなり、衝合面が高耐久鋼材からなることを特徴とする請求項1又は2記載の射出成形用金型。

【請求項4】 小コア本体内に高耐久鋼材からなる補強芯材が設けられていることを特徴とする請求項3記載の射出成形用金型。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、射出成形用金型に関し、特に硬質塩化ビニル樹脂製の管継手等の成形に使用して好適なものである。

【0002】

【従来の技術】従来、硬質塩化ビニル樹脂製の管継手等の射出成形においては、塩化水素ガス等の腐食ガスが発生し、射出成形用金型のキャビティ表面を腐食する問題があった。

【0003】このような問題を解決するために、従来は、図7に示すように、射出成形用金型（コア）（イ）の材質として、耐蝕性の優れたステンレス鋼を採用するとか、図8に示すように、射出成形用金型（コア）

（イ）の表面に硬質クロムメッキ層（ロ）を施すとか、もしくは、無電解ニッケルメッキを施すとか、或いは、例えば、特開平5-261765号公報等に記載されているように、射出成形用金型の耐蝕性等を向上させようとする部分に、セラミックコーティング等の表面処理を施すことが知られている。

【0004】

【発明が解決しようとする課題】しかしながら、叙上のように、射出成形用金型の材質として、耐蝕性の優れたステンレス鋼を採用するのは、ステンレス鋼自身が高価である上、工作に手間がかかりコスト高であるとか、熱伝導率が小さいため射出成形用金型の冷却に時間を要するとかの欠点がある。

【0005】又、硬質クロムメッキ、又は無電解ニッケルメッキを施す手段においては、表面に無数の微小穴が発生し、この微小穴から腐食ガスが侵入し、メッキ層の内側から腐食して、メッキ層が浮き上がったり、剥離する欠点がある。

【0006】又、耐蝕性等を向上させるためにセラミックコーティング等の表面処理を施すことは、高温処理を施すことが必要であり、高温処理のために射出成形用金

型に寸法変化が生じ易い欠点があった。

【0007】本発明は、このような従来の射出成形用金型における問題点に着目してなされたものであり、その目的とするところは、従来の射出成形用金型における問題点を解決し、金型材料費や工作費が安価であり、熱伝導率が高く、耐蝕性の優れた射出成形用金型を提供することにある。

【0008】

【課題を解決するための手段】上記目的を達成するために、請求項1記載の本発明射出成形用金型は、銅合金からなるコア本体の外面にニッケルとタングステンの合金による表面処理が施されることにより高耐蝕性が付与されていることを特徴とするものである。

【0009】又、請求項2記載の本発明射出成形用金型は、請求項1記載の射出成形用金型において、銅合金の代わりに炭素鋼を使用したことを特徴とするものである。

【0010】又、請求項3記載の本発明射出成形用金型は、コアが複数個の小コアからなり、金型閉合時に複数個の小コアの衝合面同士が衝合してコアが形成される射出成形用金型であって、小コアの本体が銅合金からなり、衝合面が高耐久鋼材からなることを特徴とするものである。

【0011】又、請求項4記載の本発明射出成形用金型は、請求項3記載の射出成形用金型において、小コア本体内に高耐久鋼材からなる補強芯材が設けられていることを特徴とするものである。

【0012】〔作用〕請求項1記載の本発明射出成形用金型においては、コア本体の外面にニッケルとタングステンの合金による表面処理が施されることにより高耐蝕性が付与されているので、塩化水素ガス等の腐食ガスが発生してもコアの外表面が腐食する恐れはない。

【0013】コア本体が銅合金からなるので、その熱伝導率は $0.25 \sim 0.3 \text{ cal/cm} \cdot \text{sec} \cdot ^\circ\text{C}$ であって熱伝導性に優れ、冷却時間が短くて済む。

【0014】又、請求項2記載の本発明射出成形用金型においては、銅合金の代わりに炭素鋼を使用したので、ステンレス鋼（熱伝導率 $=0.04 \sim 0.05 \text{ cal/cm} \cdot \text{sec} \cdot ^\circ\text{C}$ ）に比べて、その熱伝導率が $0.1 \text{ cal/cm} \cdot \text{sec} \cdot ^\circ\text{C}$ であって熱伝導性に優れ、冷却時間が短くて済む。

【0015】又、請求項3記載の本発明射出成形用金型においては、小コアの本体が銅合金からなるので、熱伝導性に優れ、冷却時間が短くて済む。又、衝合面が高耐久鋼材からなるので、小コアの本体が銅合金からなるものであっても小コア同士の衝合により損傷される恐れはなく、長期間の使用に耐える。

【0016】又、請求項4記載の本発明射出成形用金型においては、小コア本体内に高耐久鋼材からなる補強芯材が設けられているので、小コアの本体が銅合金からな

るものであっても小コア同士の衝合による全体変形を防止して、長期間の使用に耐える。

【0017】

【発明の実施の形態】次に、本発明の実施の形態を図面を参照しながら説明する。図1は本発明射出成形用金型の一例を示す正面図、図2は図1に示す本発明射出成形用金型の要部を示す一部切欠正面図である。図1において、1は本発明射出成形用金型の移動型、2は移動型1の外型3内に設けられたコアであり、コア2は2個の小コア21、22とから構成されている。

【0018】一方の小コア21においては、図2に示すように、銅合金からなるコア本体211の基部がステンレス鋼製のコアリング212の凹部213に挿入された上、ボルト214によりコアリング212に取付けられ、小コア21の先端衝合凹面215を除く外面には、メッキ処理によりニッケル・タングステン合金による皮膜216が被覆されている。

【0019】他方的小コア22においては、図2に示すように、銅合金からなるコア本体221の基部が一方の小コア21と同様にしてステンレス鋼製のコアリング222に取付けられ、小コア22の先端衝合凸面225を除く外面には、メッキ処理によりニッケル・タングステン合金による皮膜226が被覆されている。

【0020】図1に示すように、双方の小コア21、22のコアリング212、222はスライド板217、227に取付けられ、スライド板217、227はガイド218、228に沿って矢印で示すように往復移動可能に設けられている。

【0021】移動型1と図示しない固定型との閉合時には、図1、2に示すように、小コア21の先端衝合凹面215と小コア22の先端衝合凸面225とが衝合され、小コア21の皮膜216と小コア22の皮膜226との周囲と移動型1の外型3と図示しない固定型の外型との間にはキャビティ4が形成されるようになっている。

【0022】図3は本発明射出成形用金型の他の一例の要部を示す一部切欠正面図である。図3に示す本発明射出成形用金型のコア2aにおいては、コア本体211、221を炭素鋼製とし、図1、2に示す本発明射出成形用金型のコア2のように、コア本体211、221の基部に別個のコアリング212、222を取付ける代わりに、コアリング部12a、22aを一体的に設けたものである。

【0023】図3に示す本発明射出成形用金型のコア2aの他の点については、図1、2に示す本発明射出成形用金型のコア2と同一であり、図1、2に示す本発明射出成形用金型のコア2と同一の符号を付けることにより説明を省略する。

【0024】図4は本発明射出成形用金型の更に異なる他の一例の要部を示す一部切欠正面図である。図4に示

す本発明射出成形用金型のコア2bにおいては、図1、2に示す本発明射出成形用金型のように、コア本体211、221の先端衝合凹面215と先端衝合凸面225とにステンレス鋼製薄板2151、2251をステンレス鋼製ボルト2152で取付けることにより先端衝合凹面215と先端衝合凸面225とをステンレス鋼で構成し、コア本体211の内部の空洞2111にステンレス鋼製冷却ブッシュ2112を挿入し、冷却ブッシュ2112に冷却水路2113を設けたものである。

【0025】図4に示す本発明射出成形用金型のコア2bの他の点については、図1、2に示す本発明射出成形用金型のコア2と同一であり、図1、2に示す本発明射出成形用金型のコア2と同一の符号を付けることにより説明を省略する。尚、図示は省略しているが、図1、2と同様の皮膜216、226が被覆されている。

【0026】図4に示す本発明射出成形用金型のコア2bにおいては、先端衝合凹面215と先端衝合凸面225とがステンレス鋼で構成されているので、先端衝合凹面215と先端衝合凸面225との衝合によっては変形損傷する恐れはなく、先端衝合凹面215と先端衝合凸面225との衝合により両面は密接し、バリの発生する支障はなく、長期間にわたり使用できる。

【0027】又、図4に示す本発明射出成形用金型のコア2bにおいては、コア本体211の内部の空洞2111にステンレス鋼製冷却ブッシュ2112が挿入補強されているので、コア本体211の全体が変形する恐れはなく、長期間に亘り使用できる。

【0028】図5は本発明射出成形用金型の更に異なる他の一例の要部を示す一部切欠正面図である。図5に示す本発明射出成形用金型のコア2cにおいては、図4に示す本発明射出成形用金型のコア2bのように、ステンレス鋼製薄板2151、2251をステンレス鋼製ボルト2152で取付ける代わりに、ステンレス鋼製薄板2151、2251に突設した複数個の凸部2153、2253を先端衝合凹面215と先端衝合凸面225とに凹設した凹部2154、2254に挿入嵌合することによりステンレス鋼製薄板2151、2251を取付けたものである。

【0029】図5に示す本発明射出成形用金型のコア2cの他の点については、図4に示す本発明射出成形用金型のコア2bと同一であり、図4に示す本発明射出成形用金型のコア2bと同一の符号を付けることにより説明を省略する。尚、図4と同様、図示しない皮膜216、226が被覆されている。

【0030】図6は本発明射出成形用金型の更に異なる他の一例の要部を示す一部切欠正面図である。図6に示す本発明射出成形用金型のコア2dにおいては、図4に示す本発明射出成形用金型のコア2bのように、ステンレス鋼製薄板2151、2251とステンレス鋼製冷却ブッシュ2112とを別個のものとする代わりに、ステ

ンレス鋼製薄板2151、2251とステンレス鋼製冷却ブッシュ2112とを一体化し、ステンレス鋼製冷却ブッシュ2112の後端部を取付板2114及びボルト2115によりコア本体211に取付けたものである。

【0031】図6に示す本発明射出成形用金型のコア2dの他の点については、図4に示す本発明射出成形用金型のコア2bと同一であり、図4に示す本発明射出成形用金型のコア2bと同一の符号を付けることにより説明を省略する。尚、図4と同様、図示しない皮膜216、226が被覆されている。

【0032】

【実施例】図1、2に示す本発明射出成形用金型のコア2のニッケル・タングステン合金による皮膜216及び皮膜226のタングステン比率を44～60%とし、皮膜216及び皮膜226の厚さを15 μ mとし、塩酸法による腐食試験を実施し、溶解重量比率を測定し、その結果を表1に示した。

【0033】

【比較例1】図1、2に示すコア2のニッケル・タングステン合金による皮膜216及び皮膜226の代わりに

ニッケルメッキによる厚さ10 μ mのニッケル皮膜を施し、実施例と同様の腐食試験を実施して、溶解重量比率を測定し、その結果を表1に示した。

【0034】

【比較例2】比較例1の厚さ10 μ mのニッケル皮膜の代わりに多層クロムメッキによる厚さ5 μ mの多層クロムの皮膜を施し、実施例と同様の腐食試験を実施して、溶解重量比率を測定し、その結果を表1に示した。

【0035】

【比較例3】比較例1の厚さ10 μ mのニッケル皮膜の代わりにクロムメッキによる厚さ5 μ mのクロムの皮膜を施し、実施例と同様の腐食試験を実施して、溶解重量比率を測定し、その結果を表1に示した。

【0036】

【比較例4】図7に示すように、ステンレス鋼製のコアを使用し、実施例と同様の腐食試験を実施して、溶解重量比率を測定し、その結果を表1に示した。

【0037】

【表1】

	皮膜の厚さ (μ m)	表面硬度 (Hv)	溶解重量比率 (%)
実施例1	15	750	0.25
比較例1	10	900	2.84
比較例2	5	1900	6.07
比較例3	5	950	12.55
比較例4	—————	40 (HRc)	2.21

【0038】〔評価〕表1に示すように、実施例1においては、溶解重量比率が比較例1～4に比較して最小であり、腐食に強いことが分かった。

【0039】以上、本発明の実施の形態を図により説明したが、本発明の具体的な構成は、この実施の形態に限定されるものではなく、本発明の要旨を逸脱しない範囲の設計変更等があっても本発明に含まれる。

【0040】

【発明の効果】請求項1記載の本発明射出成形用金型においては、コア本体の外面にニッケルとタングステンの合金による表面処理が施されることにより高耐蝕性が付与されているので、塩化水素ガス等の腐食ガスが発生してもコアの外表面が腐食する恐れはない。

【0041】コア本体が銅合金からなるので、その熱伝導率が0.25～0.3 cal/cm \cdot sec \cdot ℃であ

って熱伝導性に優れ、冷却時間が短くて済む。

【0042】又、請求項2記載の本発明射出成形用金型においては、銅合金の代わりに炭素鋼を使用したので、ステンレス鋼（熱伝導率＝0.04～0.05 cal/cm \cdot sec \cdot ℃）に比べて、その熱伝導率が0.1 cal/cm \cdot sec \cdot ℃であって熱伝導性に優れ、冷却時間が短くて済む。

【0043】又、請求項3記載の本発明射出成形用金型においては、小コアの本体が銅合金からなるので、熱伝導性に優れ、冷却時間が短くて済む。又、衝合面が高耐久鋼材からなるので、小コアの本体が銅合金からなるものであっても小コア同士の衝合により損傷される恐れはなく、長期間の使用に耐える。

【0044】又、請求項4記載の本発明射出成形用金型においては、小コア本体内に高耐久鋼材からなる補強芯

材が設けられているので、小コアの本体が銅合金からなるものであっても小コア同士の衝合による全体変形を防止して、長期間の使用に耐える。

【図面の簡単な説明】

【図1】本発明射出成形用金型の一例を示す正面図。

【図2】図1に示す本発明射出成形用金型の要部を示す一部切欠正面図。

【図3】本発明射出成形用金型の他の一例を示す一部切欠正面図。

【図4】本発明射出成形用金型の更に異なる他の一例を示す一部切欠正面図。

【図5】本発明射出成形用金型の更に異なる他の一例を示す一部切欠正面図。

【図6】本発明射出成形用金型の更に異なる他の一例を

示す一部切欠正面図。

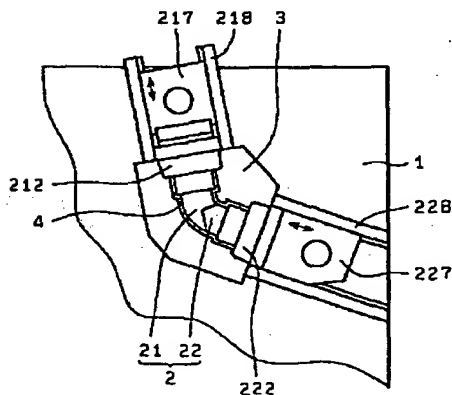
【図7】従来の射出成形用金型の一例を示す一部切欠正面図。

【図8】従来の射出成形用金型の他の一例を示す一部切欠正面図。

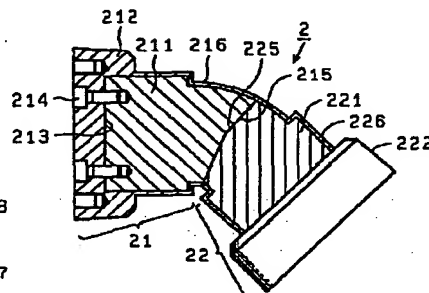
【符号の説明】

- 1 移動型
- 2 コア
- 21、22 小コア
- 211、221 コア本体
- 212、222 コアリング
- 215 先端衝合凹面
- 225 先端衝合凸面
- 216、226 皮膜

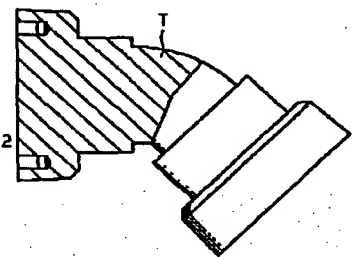
【図1】



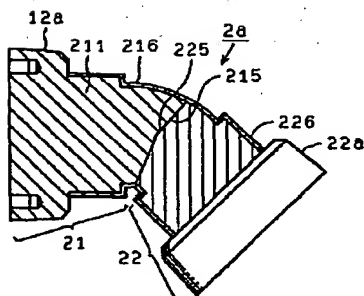
【図2】



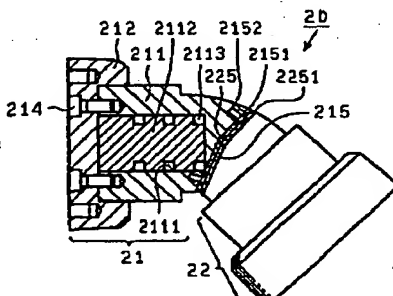
【図7】



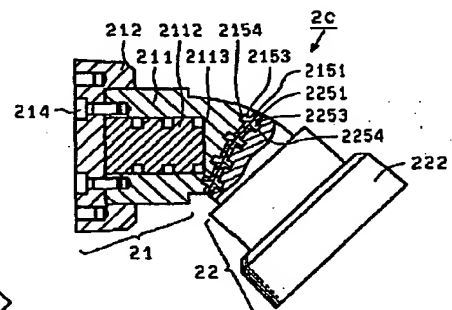
【図3】



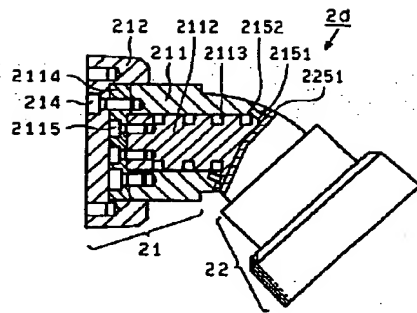
【図4】



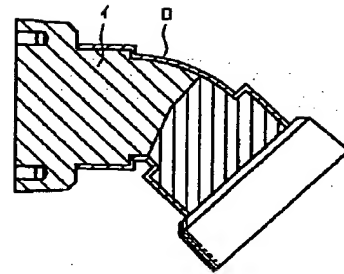
【図5】



【図6】



【図8】



PATENT ABSTRACTS OF JAPAN

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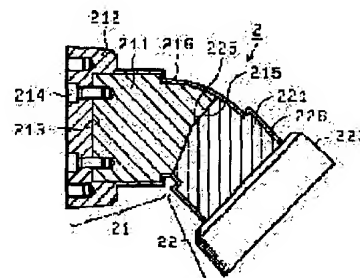
(72)Inventor : **WADA ATSUSHI**

(54) INJECTION MOLDING DIE

(57)Abstract:

PROBLEM TO BE SOLVED: To increase heat conductivity and provide high corrosion resistance by applying the surface treatment using an alloy of nickel and tungsten on the outer face of a core main body composed of copper alloy.

SOLUTION: One small core 21 is formed by inserting a base of a core main body 211 composed of copper alloy into a recessed section 213 of a core ring 212, installing the core ring 212 by using a ball 14 and curing the outer face except an end hitting recessed face 215 of a small core 21 with a film 216. The other small core 22 is formed by mounting a base of the core main body 221 composed of a copper alloy or a core ring 222 in a similar manner for the above-said small core 21 and coating the outer face except an end heating protruded face 225 of the small core 22 with a film 226 formed of the nickel and tungsten alloy by plating. The high heat conductivity and high corrosion resistance can be provided and the fear of generating of corrosion on the outer face of the cores is eliminated by the arrangement.



LEGAL STATUS

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3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention -- injection molding -- public funds -- it is related with type, it is especially used for fabrication of the pipe joint made of rigid PVC etc., and is suitable

[0002]

[Description of the Prior Art] injection molding, such as a pipe joint made of the former and rigid PVC, -- setting -- corrosion gas, such as hydrogen chloride gas, -- generating -- injection molding -- there was a problem which corrodes a public-funds type cavity front face

[0003] in order to solve such a problem, it is conventionally shown in drawing 7 -- as -- injection molding -- public funds, as the corrosion-resistant outstanding stainless steel is adopted as the quality of the material of a type (core) (b) or it is shown in drawing 8 injection molding -- public funds -- a hard-chrome-plating layer (b) being given to the front face of a type (core) (b), or non-electrolyzed nickel plating is performed or it is indicated by JP,5-261765,A etc. -- as -- injection molding -- performing surface treatment, such as ceramic coating, to the portion which is going to raise public-funds type corrosion resistance etc. is known

[0004]

[Problem(s) to be Solved by the Invention] however, ** -- above -- injection molding -- the top where the stainless steel of adopting the corrosion-resistant outstanding stainless steel as the public-funds type quality of the material itself is expensive, and machining -- time and effort -- starting -- cost quantity -- it is -- since thermal conductivity is small -- injection molding -- public-funds type cooling takes time, or there is a thing fault

[0005] Moreover, in a means to perform hard chrome plating or non-electrolyzed nickel plating, a countless minute hole occurs on a front face, corrosion gas trespasses upon it from this minute hole, and it corrodes from the inside of a deposit, and a deposit comes floating or there is an exfoliating fault.

[0006] moreover, the thing which performing surface treatment, such as ceramic coating, in order to raise corrosion resistance etc. performs for high temperature processing -- required -- a high temperature processing sake -- injection molding -- public funds -- type had the fault which a dimensional change tends to produce

[0007] such [this invention] conventional injection molding -- public funds -- injection molding of the former [place / which it is made paying attention to the trouble in type, and is made into the purpose] -- public funds -- the trouble in type -- solving -- metal mold -- injection molding which the cost of materials and machining expense were cheap, and whose thermal conductivity was high, and was excellent in corrosion resistance -- public funds -- it is in offering type

[0008]

[Means for Solving the Problem] in order to attain the above-mentioned purpose -- this invention injection molding according to claim 1 -- public funds -- type is characterized by giving high corrosion resistance by performing surface treatment by the alloy of nickel and a tungsten to the superficies of the

core main part which consists of a copper alloy

[0009] moreover, this invention injection molding according to claim 2 -- public funds -- type -- injection molding according to claim 1 -- public funds -- in type, it is characterized by using carbon steel instead of a copper alloy

[0010] moreover, this invention injection molding according to claim 3 -- public funds -- from the small core of plurality [type / core] -- becoming -- metal mold -- injection molding with which the attachment sides of two or more small cores attach, and a core is formed at the time of closing -- public funds -- it is type, and the main part of a small core consists of a copper alloy, and an attachment side is characterized by the bird clapper from high durable steel materials

[0011] moreover, this invention injection molding according to claim 4 -- public funds -- type -- injection molding according to claim 3 -- public funds -- in type, it is characterized by preparing the reinforcement core material which consists of high durable steel materials in a small core main part

[0012] [an operation] -- this invention injection molding according to claim 1 -- public funds -- in type, since high corrosion resistance is given by performing surface treatment by the alloy of nickel and a tungsten to the superficies of a core main part, even if corrosion gas, such as hydrogen chloride gas, occurs, there is no possibility that the superficies of a core may corrode

[0013] Since a core main part consists of a copper alloy, the thermal conductivity is 0.25-0.3cal/cm-secand**, is excellent in thermal conductivity, and its cooldown delay is short and it ends.

[0014] moreover, this invention injection molding according to claim 2 -- public funds -- in type, since carbon steel was used instead of the copper alloy, compared with stainless steel (thermal conductivity =0.04-0.05cal/cm-secand**), the thermal conductivity is 0.1cal/cm-secand**, and it excels in thermal conductivity, and a cooldown delay is short and ends

[0015] moreover, this invention injection molding according to claim 3 -- public funds -- in type, since the main part of a small core consists of a copper alloy, it excels in thermal conductivity, and a cooldown delay is short and ends Moreover, since an attachment side consists of high durable steel materials, even if the main part of a small core consists of a copper alloy, there is no possibility that attachment of small cores may be damaged, and it is equal to prolonged use.

[0016] moreover, this invention injection molding according to claim 4 -- public funds -- in type, since the reinforcement core material which consists of high durable steel materials is prepared in the small core main part, even if the main part of a small core consists of a copper alloy, the whole deformation by attachment of small cores is prevented, and it is equal to prolonged use

[0017]

[Embodiments of the Invention] Next, the gestalt of operation of this invention is explained, referring to a drawing. drawing 1 -- this invention injection molding -- the front view showing a public-funds type example, and this invention injection molding which shows drawing 2 to drawing 1 -- a public-funds type important section is shown -- it is notch front view in part drawing 1 -- setting -- 1 -- this invention injection molding -- a public-funds type moved type and 2 are the cores prepared in the dies body 3 of moved type 1, and the core 2 consists of two small cores 21 and 22

[0018] In one small core 21, as shown in drawing 2 , after the base of the core main part 211 which consists of a copper alloy is inserted in the crevice 213 of the coring 212 made from stainless steel, it is attached in coring 212 with a bolt 214, and the coat 216 by the nickel tungsten alloy is covered with plating processing by the superficies except the nose-of-cam attachment concave surface 215 of the small core 21.

[0019] In the small core 22 of another side, as shown in drawing 2 , the base of the core main part 221 which consists of a copper alloy is attached in the coring 222 made from stainless steel like one small core 21, and the coat 226 by the nickel tungsten alloy is covered with plating processing by the superficies except the nose-of-cam attachment convex 225 of the small core 22.

[0020] As shown in drawing 1 , the coring 212 and 222 of both small cores 21 and 22 is attached in the slide boards 217 and 227, and the slide boards 217 and 227 are formed possible [both-way movement], as an arrow shows along with guides 218 and 228.

[0021] As shown in drawing 1 and 2 at the time of closing with moved type 1 and the cover half which

is not illustrated, the nose-of-cam attachment concave surface 215 of the small core 21 and the nose-of-cam attachment convex 225 of the small core 22 are attached, and a cavity 4 is formed between the circumference of the coat 216 of the small core 21, and the coat 226 of the small core 22, the dies body 3 of moved type 1, and the dies body of the cover half which is not illustrated.

[0022] drawing 3 -- this invention injection molding -- the important section of other public-funds type examples is shown -- it is notch front view in part this invention injection molding shown in drawing 3 - - this invention injection molding which makes the core main parts 211 and 221 the product made from carbon steel in public-funds type core 2a, and is shown in drawing 1 and 2 -- like the public-funds type core 2, the coring sections 12a and 22a are formed in one instead of attaching the separate coring 212 and 222 in the base of the core main parts 211 and 221

[0023] this invention injection molding shown in drawing 3 -- this invention injection molding shown in drawing 1 and 2 about other points of public-funds type core 2a -- this invention injection molding which is the same as that of the public-funds type core 2, and is shown in drawing 1 and 2 -- explanation is omitted by attaching the same sign as the public-funds type core 2

[0024] drawing 4 -- this invention injection molding -- public funds -- the important section of other examples from which type differs further is shown -- it is notch front view in part In public-funds type core 2b this invention injection molding shown in drawing 4 -- drawing 1 and this invention injection molding shown in 2 -- public funds -- like type The nose-of-cam attachment concave surface 215 and the nose-of-cam attachment convex 225 are constituted from stainless steel by attaching the sheet metal 2151 and 2251 made from stainless steel in the nose-of-cam attachment concave surface 215 and the nose-of-cam attachment convex 225 of the core main parts 211 and 221 with the bolt 2152 made from stainless steel. The cooling bush 2112 made from stainless steel is inserted in the cavity 2111 inside the core main part 211, and the cooling water way 2113 is established in the cooling bush 2112.

[0025] this invention injection molding shown in drawing 4 -- this invention injection molding shown in drawing 1 and 2 about other points of public-funds type core 2b -- this invention injection molding which is the same as that of the public-funds type core 2, and is shown in drawing 1 and 2 -- explanation is omitted by attaching the same sign as the public-funds type core 2 In addition, although illustration is omitted, drawing 1 and the same coats 216 and 226 as 2 are covered.

[0026] this invention injection molding shown in drawing 4 -- since the nose-of-cam attachment concave surface 215 and the nose-of-cam attachment convex 225 consist of stainless steel in public-funds type core 2b, depending on attachment with the nose-of-cam attachment concave surface 215 and the nose-of-cam attachment convex 225, there is no possibility of carrying out a deformation injury, both sides are close with attachment with the nose-of-cam attachment concave surface 215 and the nose-of-cam attachment convex 225, there is no trouble which a barricade generates, and it can be used over a long period of time

[0027] moreover, this invention injection molding shown in drawing 4 -- in public-funds type core 2b, since insertion reinforcement of the cooling bush 2112 made from stainless steel is carried out in the cavity 2111 inside the core main part 211, there is no possibility that the whole core main part 211 may deform, continues and can be used for a long period of time

[0028] drawing 5 -- this invention injection molding -- public funds -- the important section of other examples from which type differs further is shown -- it is notch front view in part In public-funds type core 2c this invention injection molding shown in drawing 5 -- this invention injection molding shown in drawing 4 -- like public-funds type core 2b instead of attaching the sheet metal 2151 and 2251 made from stainless steel with the bolt 2152 made from stainless steel The sheet metal 2151 and 2251 made from stainless steel is attached in the crevices 2154 and 2254 which cut in the nose-of-cam attachment concave surface 215 and the nose-of-cam attachment convex 225 two or more heights 2153 and 2253 which protruded on the sheet metal 2151 and 2251 made from stainless steel by carrying out insertion fitting.

[0029] this invention injection molding shown in drawing 5 -- this invention injection molding shown in drawing 4 about other points of public-funds type core 2c -- this invention injection molding which is the same as that of public-funds type core 2b, and is shown in drawing 4 -- explanation is omitted by

attaching the same sign as public-funds type core 2b In addition, the coats 216 and 226 which are not illustrated are covered like drawing 4 .

[0030] drawing 6 -- this invention injection molding -- public funds -- the important section of other examples from which type differs further is shown -- it is notch front view in part In public-funds type core 2d this invention injection molding shown in drawing 6 -- this invention injection molding shown in drawing 4 -- like public-funds type core 2b instead of making separate the sheet metal 2151 and 2251 made from stainless steel, and the cooling bush 2112 made from stainless steel The sheet metal 2151 and 2251 made from stainless steel and the cooling bush 2112 made from stainless steel are unified, and the back end section of the cooling bush 2112 made from stainless steel is attached in the core main part 211 with a tie-down plate 2114 and a bolt 2115.

[0031] this invention injection molding shown in drawing 6 -- this invention injection molding shown in drawing 4 about other public-funds type core 2d points -- this invention injection molding which is the same as that of public-funds type core 2b, and is shown in drawing 4 -- explanation is omitted by attaching the same sign as public-funds type core 2b In addition, the coats 216 and 226 which are not illustrated are covered like drawing 4 .

[0032]

[Example] drawing 1 and this invention injection molding shown in 2 -- the tungsten ratio of the coat 216 by the nickel tungsten alloy of the public-funds type core 2 and a coat 226 was made into 44 - 60%, thickness of a coat 216 and a coat 226 was set to 15 micrometers, the corrosion test by the hydrochloric-acid method was carried out, the dissolution weight ratio was measured, and the result was shown in Table 1

[0033]

[The example 1 of comparison] The nickel coat with a thickness [by nickel plating] of 10 micrometers was given instead of the coat 216 by drawing 1 and the nickel tungsten alloy of the core 2 shown in 2, and the coat 226, the same corrosion test as an example was carried out, the dissolution weight ratio was measured, and the result was shown in Table 1.

[0034]

[The example 2 of comparison] The coat of multilayer chromium with a thickness [by multilayer chrome plating] of 5 micrometers was given instead of the nickel coat with a thickness [of the example 1 of comparison] of 10 micrometers, the same corrosion test as an example was carried out, the dissolution weight ratio was measured, and the result was shown in Table 1.

[0035]

[The example 3 of comparison] The coat of chromium with a thickness [by chrome plating] of 5 micrometers was given instead of the nickel coat with a thickness [of the example 1 of comparison] of 10 micrometers, the same corrosion test as an example was carried out, the dissolution weight ratio was measured, and the result was shown in Table 1.

[0036]

[The example 4 of comparison] As shown in drawing 7 , the core made from stainless steel was used, the same corrosion test as an example was carried out, the dissolution weight ratio was measured, and the result was shown in Table 1.

[0037]

[Table 1]

	皮膜の厚さ (μm)	表面硬度 (Hv)	溶解重量比率 (%)
実施例 1	15	750	0.25
比較例 1	10	900	2.84
比較例 2	5	1900	6.07
比較例 3	5	950	12.55
比較例 4	—————	40 (HRC)	2.21

[0038] [Evaluation] As shown in Table 1, in an example 1, a dissolution weight ratio is the minimum as compared with the examples 1-4 of comparison, and it turns out that it is strong to corrosion.

[0039] As mentioned above, although drawing explained the gestalt of operation of this invention, the concrete composition of this invention is not limited to the gestalt of this operation, and even if the design change of the range which does not deviate from the summary of this invention etc. occurs, it is included in this invention.

[0040]

[Effect of the Invention] this invention injection molding according to claim 1 -- public funds -- in type, since high corrosion resistance is given by performing surface treatment by the alloy of nickel and a tungsten to the superficies of a core main part, even if corrosion gas, such as hydrogen chloride gas, occurs, there is no possibility that the superficies of a core may corrode

[0041] Since a core main part consists of a copper alloy, the thermal conductivity is 0.25-0.3cal/cm-second**, and it excels in thermal conductivity, and a cooldown delay is short and ends.

[0042] moreover, this invention injection molding according to claim 2 -- public funds -- in type, since carbon steel was used instead of the copper alloy, compared with stainless steel (thermal conductivity =0.04-0.05cal/cm-second**), the thermal conductivity is 0.1cal/cm-second**, and it excels in thermal conductivity, and a cooldown delay is short and ends

[0043] moreover, this invention injection molding according to claim 3 -- public funds -- in type, since the main part of a small core consists of a copper alloy, it excels in thermal conductivity, and a cooldown delay is short and ends Moreover, since an attachment side consists of high durable steel materials, even if the main part of a small core consists of a copper alloy, there is no possibility that attachment of small cores may be damaged, and it is equal to prolonged use.

[0044] moreover, this invention injection molding according to claim 4 -- public funds -- in type, since the reinforcement core material which consists of high durable steel materials is prepared in the small core main part, even if the main part of a small core consists of a copper alloy, the whole deformation by attachment of small cores is prevented, and it is equal to prolonged use

[Translation done.]